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THE PLANT DISEASE BULLETIN

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THE PLANT DISEASE SURVEY

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August 1, 1922.

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

THE PLANT DISEASE BULLETIN

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THE PLANT DISEASE SURVEY

Vol. VI. August 1, 1922 Number 3

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STEM RUST OF WHEAT, POWDERY MILDEW OF RED CLOVER, AND FIRE BLIGHT OF APPLE - SPECIAL FEATURES OF THIS BULLETIN

Distribution of the Plant Disease Bulletin, August 1, 1922. Figures indicate number of copies.

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NOTICE

FIELD MEETING OF PLANT PATHOLOGISTS FOR THE STUDY OF VEGETABLE DISEASES IN THE VICINITY OF PHILADELPHIA, AUGUST 28 - SEPTEMBER 1.

DAMAGE FROM STEM RUST OF WHEAT NOT GREAT THIS YEAR

WINTER WHEAT ONLY SLIGHTLY AFFECTED AND DANGER TO SPRING WHEAT PRACTICALLY OVER

As will be seen from the following reports, infection of wheat and other cereals with stem rust is very slight this year. On wheat the disease is scattered in its distribution, occurring for the most part as local outbreaks. Some of these have caused heavy losses over small areas but in the northern wheat states there has been no general epidemic this year.

The Plant Disease Survey requested the state leaders in Barbery Eradication to report information on stem rust as of July 12, and the accompanying reports, tables, and maps are, for the most part, based on material received from them and from H. D. Barker of Minnesota. This year they have obtained many excellent illustrations showing the importance of the barberry to the occurrence of stem rust. A great many cases showing that the barberry is responsible for stem rust outbreaks could be given, but the following excellent description by K. E. Beeson, of Indiana, will serve as an example. (Cereal Courier 14: 181-182. July 20, 1922).

> "A rust epidemic near Alert, Bartholomew County, was one of those investigated by the State Leader. A survey in which the county agent and interested farmers assisted showed an area about four miles long and one and one-half miles wide in which the wheat was so badly infested with black stem rust that part of it had not been harvested. Outside this area the rust decreased and practically disappeared. This is in a rich farming country where the wheat acreage was unusually large, the average from 35 to 100 acres in wheat. Two hundred and fifty acres in this region were completely ruined, and Mr. Elliott, a farmer, placed the loss at $7,000. This does not include 500 acres, the area in which the grain is a partial loss. A local miller upon examination classed grain from one of these fields as "sample", requiring on a $1.00-per-bushel-basis a 29-cent dockage. A 20-bushel yield estimate in this area would mean a loss of $2,900, thus making the total loss in this region this year about $10,000. The estimate was verified by the local banker who assisted in the survey.
>
> "Farmers reported previous rust epidemics over a number of years. Had epidemics of this nature occurred but once in every five years because of rust (epidemics are variable, depending upon climatic and seasonal conditions), the loss during a 60-year period would have been $65,000 with wheat at 50 cents a bushel.
>
> "One large 60-year old bush was located in the southwestern part of this infested region and was responsible for the spread on all sides but more especially to the north and east with the generally prevailing winds in this direction, for it was on that side that the infection was heaviest. The leaves of the bush were still very heavily infected, and farmers traced previous epidemics to this bush after they learned its relationship to the rust. In 1921 it had been responsible for the rusting of wheat in the fields on both sides of it, so that the grain was largely ruined.
>
> "This case against the barberry in this particular locality is similar to those in many localities and illustrates the damage that can be traced to a single bush or to a group of bushes."

Reports on Prevalence of, and Prospects for, Stem Rust

Ohio: During the latter part of May and the first few days of June black stem rust was making its appearance on wheat in several widely separated places in west-central Ohio. Prior to June 5 stem rust on wheat in the Miami Valley was confined to a radius of 500 feet from infected barberries. By June 20 stem rust on wheat near the infected bushes had become heavy. By July 1 the spread of stem rust in wheat throughout the state had practically ended. Stem rust on oats, barley, and rye are of minor importance. Rust susceptible grasses seem to play a minor role in the spread of rust except in the northern part of the state. (John W. Baringer, July 24).

This disease is much less in evidence this year than last and is thought to be less than during average years. Local infections were severe in association with nearby clumps of barberry. (Roy C. Thomas, July 15).

Indiana: Infection on wheat and rye very scattered except where close to infected bushes. Infection on oats very light. Few susceptible grasses in this state. (K. E. Beeson, July 19).

Illinois: Wheat seemed to be infected slightly with stem rust all over the state. Slight infections were found on quack grass, oats, rye, barley, orchard grass, and wild barley near barberries in northern Illinois during May and June. On red top and timothy, it was found in both northern and southern Illinois during this period.

The injury from stem rust on the different grain crops in Illinois this year will not be greater than 1%. (Gordon C. Curran, July 12).

Michigan: No severe attack of black stem rust has been observed either near to or removed from barberry infection. Stem rust has been observed upon several grains and grasses.

No severe attack expected, but overwintering material will be generally distributed. (Walter F. Reddy, July 12).

Stem rust not as yet common in fields although wheat is in hard dough stage. A few cases found, but these were close to barberry and already in teliospore stage. (G. H. Coons, July 12).

Wisconsin: Dry weather in June prevented the spread of the rust and very little damage has been noticed. In most fields there is only a trace of stem rust. (Noel F. Thompson, July 12).

Minnesota: Barberries are universally infected whenever found. The aecial stage has about passed, although it appears from time to time. At present stem rust is rather general in the state although it is worse in some regions than others. If the present weather conditions continue for the next ten days the grain will be comparatively safe, but if we get hot, moist weather there is sufficient inoculum generally all over the state to cause a severe epidemic. However, prospects look bright for an excellent crop where they have had sufficient rainfall. (Leonard W. Melander, July 11).

Winter wheat will mature early in July. The amount of infection varied, in most fields ranging from 5-10%. A few fields were found in

Goodhue County in which as many as 25% of the plants were infected. The rust developed too late to do much damage. (Section of Plant Pathology, July 15).

South Dakota: In every instance where barberries have been found this year there has been infection on them. The infection upon grasses, wheat, and other cereals has been very light. At present it appears that within three weeks a great deal of our small grain crops will be harvested, and it hardly seems possible that under existing cool weather conditions rust can do more than a trace of damage. (Lynn D. Hutton, July 11).

Iowa: Stem rust, in so far as found, shows very slight infection, and most of the wheat was harvested before rust could do any damage. It seems to be generally prevalent in the northern and central portions of the state. We have had a severe drought that has made the grain ripen rapidly and held in check the various plant diseases. (J. H. Muncie, July 10).

Only a trace, less than I have seen any time during the last seven years. (Melhus, July 15).

Nebraska: The prevalence of stem rust of wheat is general but in very small quantities. Most of the winter wheat escaped this year. Stem rust on rye not general. Near heavily infected barberries in Hall County winter rye was very heavily infected about two miles distant from the barberry hedge. There was very little rust on oats except near barberries. Barley was usually rusted throughout the eastern half of the state. The infection was light, however.

Winter wheat has already been harvested and is practically free from stem rust. Spring wheat and other small grains will be damaged only slightly. (A. F. Thiel, July 12).

Kansas: In a few counties very heavy infection occurred. Traces occurred in practically all the chief wheat counties. Warm weather with lack of rain checked what might have been an epidemic. Infection in a light form was present early and would undoubtedly have spread rapidly had climatic conditions not interfered. (Melchers, July 15).

Arkansas: Of no importance this year. (Elliott, July 1).

Wyoming: There has been no stem rust in this state during the present year. However, the counties of Fremont, Sweetwater, Carbon, Uinta, and Lincoln have not been visited yet. The other counties have been visited twice, and I have yet to find any rust. Rusted barberry was found at Cheyenne June 12 and at Sundance June 22. The grains and grasses near the rusted barberry were not rusted when the aecia were found. There will be but little rust this year in this state. (Ralph U. Cotter, July 12).

Colorado: On a twenty-day trip terminating June 30 not an indication of "stem rust" of wheat was found until twelve barberry bushes were located heavily infected. East, south, and west of this, wheat was found infected from a trace to as much as 10%. In the immediate vicinity of the bushes infection was heavier and gradually grew less at farther distance. (C. D. Learn, July 11).

Montana: No rust present in state on wheat except one pustule found at Ekalaka July 1. (Christopher, July 24).

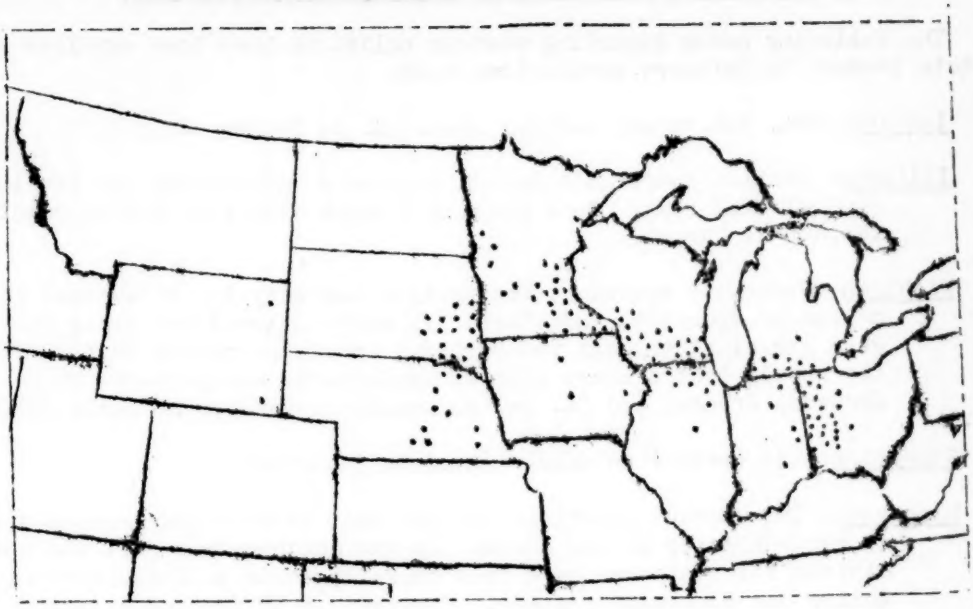

Fig. 5. Counties from which infected barberry has been reported to date of July 12, 1922. Data supplied by barberry eradication state leaders.

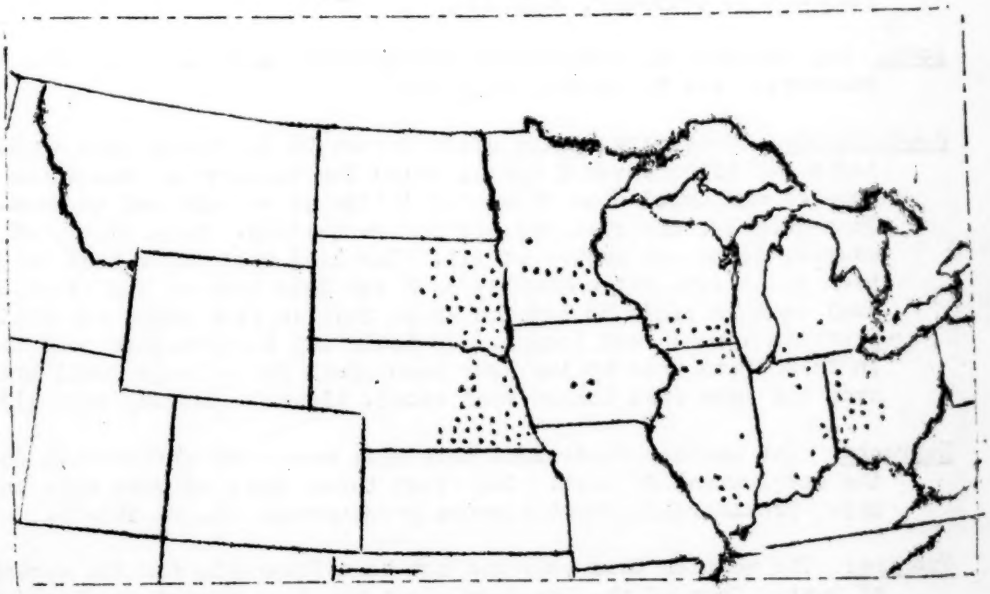

Fig. 6. Occurrence of stem rust on wheat as reported by barberry eradication state leaders, July 12, 1922.

Relation of this Year's Weather Conditions to Stem Rust

The following notes regarding weather relations have been supplied by the state leaders in barberry eradication work:

Indiana: Wet, hot spring and dry June. (K. E. Beeson, July 19).

Illinois: Weather conditions during June were unfavorable for development of stem rust. June was a dry month with very little rainfall. (Gordon C. Curran).

Michigan: Generally speaking, the weather was very dry throughout the period of sporidial infection. In certain localized areas rains were prevalent through the barberry infection period (May), with the result that a heavy crop of aeciospores was produced in Lenawee, Branch, and St. Joseph Counties. (Walter F. Reddy, July 12).

Wisconsin: Dry weather in June. (Noel F. Thompson).

Minnesota: The weather relations to stem rust have varied considerably in various parts of the state. In the southeastern part the conditions for rust were very good where there is sufficient precipitation and some warm weather. However, it is fortunate that there has not been the so-called warm, humid, weather in this section. In the southern, southwestern, and western portions of the state, the precipitation has been very irregular and somewhat spotted. In some communities, there has been no rain at all. Of course these dry areas are not conducive to the production of rust. (Leonard W. Melander, July 11).

Iowa: Dry weather has effectively checked stem rust and infection on barberry. (J. H. Muncie, July 10).

South Dakota: The spring seemed quite favorable to severe rust conditions but after several spring rains the weather in this state changed and until June 26 we had little or no rain and no dews. Consequently, the rust did not mature quickly. Much of it, of course, could not mature at all. The last week and a half it has been quite wet, but unusually cool for this time of the year. This cool weather tends to let the grain fill in fine shape and still prevents severe rust losses. We could say that weather conditions in this state this spring have been ideal for a large small grain crop and less rust losses than usual. (Lynn D. Hutton, July 11).

Nebraska: The weather conditions this year were very unfavorable for the development of rust. The first three weeks of June were very dry. Considerable wheat ripened prematurely. (A. F. Thiel).

Wyoming: The weather this year has not been favorable for the spread of rust. Some of the dry farm wheat has been burned up already, and the conditions over the state are very dry. In the spring it rained so much that the crops were late in being planted, since planting very little rain has fallen. (Ralph U. Cotter, July 19).

Table 3. Dates of first observation of appearance of Puccinia graminis in 1922, according to the state leaders in barberry eradication work.

State	Barberry		Grasses		Cereals	
	Date	Place	Date	Place	Date	Place
Ohio	Pycnia Apr. 11 Aecia Apr. 17	Yellow Springs, Green County Montgomery County			May 27	Preble and Montgomery Counties. (Wheat near barberries)
Indiana	June 26	Decatur County (infection black and dry)	July 4	Warren County (Hordeum jubatum)	June 1 June 26	Southern part (wheat) Decatur Co. (wheat near barberry)
Illinois	May 6	Gurnee, Lake County	June 10	Gurnee, Lake County	June 11	St. Clair Co. (wheat)
Michigan	May 15	Ingham & Lenawee Cos.	May 15	Lenawee County	June 3	St. Joseph Co. (wheat)
Wisconsin	Apr. 29	Dane County			June 1	Dane County (oats)
Minnesota	Pycnia May 5	Rice County	May 18	Hennepin County (quack grass near barberry)	May 26	Blue Earth Co. (wheat near barberry)
Iowa	June 13 & 23	Several counties				
North Dakota	May 22	Jamestown, Stutzman Co.	June 2	Richland Co. (near barberries)		
South Dakota	May 9	Sanborn Co. 2.5 mi. N.E. of Forestburg	June 21	Northville (close to barberry hedge)	June 21	Northville (wheat close to barberry hedge)
Nebraska	Pycnia Apr. 20 Aecia May 6	Lincoln Gage, Lancaster, Adams, Hall counties	May 22	---- (western wheat grass and wild barley under infected barberries)	May 22	----
Montana			June 26	Rosebud Co. (near barberries)		
Wyoming	June 12	Cheyenne, Laramie Co.				
Colorado	May 8	Denver, Arapahoe Co.			June 15	Morgan County

ADDITIONAL REPORTS ON LEAF RUST OF WHEAT

From Ohio, R. C. Thomas reports that infection was general throughout the state but little loss was occasioned. In Michigan, according to G. H. Coons, the disease was common beginning with the first development of plants. The leaves were badly affected early in the season, and following the milk stage the grain developed entirely on stem and leaf-sheath green. Coons thinks that the loss must be considerable although the grain appeared plump. In South Dakota the rust was abundant, according to Evans, no field being free from it. No damage resulted, however. Vaughan in Wisconsin records it as very heavy this year and particularly noticeable on the club varieties. From Iowa, on July 15, Melhus reports that the rust is less severe than last year on account of its being held in check by hot, dry weather in June. From Kansas, on July 15, Melchers writes that leaf rust is very prevalent in most parts of the state, the foliage being completely dried in many fields but very little spread of rust to leaf-sheaths. C. D. Learn, in Colorado, observed leaf rust as prevalent on winter wheat in the dry land areas. In the irrigated sections on spring wheats very small amounts were found.

REPORT OF THE ANTHRACNOSE OUTBREAK IN OHIO

The members of the Department of Botany of the Ohio Experiment Station have recently investigated the unusual occurrences of anthracnose in that state and regarding the situation R. C. Thomas writes, on July 15, as follows:

> "This disease is causing greater loss to the wheat crop in Ohio this year than it has ever been known to do before. Losses vary from a trace to 90%. Infection has been found to be particularly severe in southern portions of the state. In many sections where the black stem rust was so severe last season (1921) anthracnose is the only disease to be found this year causing any appreciable loss."

A special leaflet entitled "Anthracnose disease causes weak jointed straw, with falling of same and failure of grain to fill" was issued from the Ohio Experiment Station, July 11. In this leaflet, the symptoms of the disease are described; the hosts - rye, oats, timothy, chess, orchard grass, and blue grass, are mentioned; and the control measures, seed selection, and disinfection, and crop rotation are briefly discussed.

SCAB REPORT FROM OHIO

Ohio: The Fusarium form of scab attack on heads of wheat was general over Ohio during the season. Counts of percentages were not made in large numbers, but estimated infections range as high as 20% with 3 to 5% loss in yield. In one instance in Champaign County the Gibberella form of the fungus attacked the lower nodes and sheaths, causing pronounced failure to fill. This was in association with attacks of leaf rust. (Selby, July 15).

In Wisconsin Dickson reports scattered late infection of winter wheat. From Iowa, Melhus reports 2% scab on July 15, and from Illinois the disease was reported on the same date as causing slight damage. From South Dakota Evans reports no scab on winter wheat, July 15.

BUNT OF WHEAT AS REPORTED BY COLLABORATORS IN SOME OF THE EASTERN STATES

Moderate amounts of bunt caused, for the most part, by Tilletia laevis are reported in winter wheat from eastern and central states as follows:

Virginia: Very slight, no severe cases reported. (Fromme, July 1).

Tennessee: Covered smut of wheat is about 1%. (Sherbakoff, June 3).

Arkansas: About 4% damage. (Elliott, July 1).

Ohio: Bunt is quite general though rarely in sufficient quantity to cause severe losses. One case from Wood County showed 10-15% loss. The cases reported were numerous in southwestern Ohio. Apparently losses are not commonly considered as appreciable. Wheat seed treatment is infrequent. (W. J. Young, July 15).

Illinois: Distributed generally throughout the wheat areas of the state, but present only in small amounts. Our reports indicate very slight infections this season and no appreciable loss. (Tehon, July 15).

Michigan: Smut of wheat (Tilletia laevis) present but less than normal. Heavily smutted grain of susceptible varieties giving 50% or more of smut in crop (winter wheat). Fairly clean grain practically smut free. Dust control extremely promising and as efficient as dry formaldehyde. (Coons, July 12).

Iowa: Very spotted, varied from 0 to 12%. This smut is not common except in isolated fields. (Melhus, July 15).

Kansas: Not as prevalent as 1920 and 1921. Only a trace in some fields, others had as high as 20%. The wheat crop as a whole was free. (Melchers, July 15).

LOOSE SMUT OF WHEAT

The following reports are like those from other states recorded in earlier numbers of the Bulletin, in that they show the disease as common in about the usual amounts, and that it is a factor of importance.

Ohio: Loose smut is rather more frequent than in average seasons. One field in Wood County showed 10% of loose smut. The amount reported is greater in southwestern counties reaching 4-6% and occurring more frequently than the stinking smut. Seed treatment is not extensively practiced for loose smut but appears desirable. (Young, July 15).

Illinois: Occurrence, throughout the state. Infection and loss corelative, and averaging about 5%. Infection varies from as low as one head in 10,000 to 30 in a hundred. Seed treatment is practiced only rarely. (Tehon, July 15).

Michigan: Loose smut of wheat present but high percentage of 1921 not being repeated. On account of reduction by rather severe winter. (Coon, July 12).

Wisconsin: Few fields showing 3-4%, trace often present. (Dickson, July 15).

A DISEASE CAUSING FAILURE OF WHEAT HEADS TO FILL REPORTED FROM MONTANA

CAUSE UNKNOWN

Montana: Have seen and heard of considerable damage in winter wheat due to a failure of part or all of the head to fill. In some cases the stalk is broken over at points 6 or 8 inches below head. Often dark colored lesions are found on the leaf sheaths and culm, and on base of glumes. These lesions as well as spots on leaves suggest bacterial cause. Not infrequently all the leaves are found to be blighted, while many leaves on neighboring plants are quite healthy and green.

Roots and crown appear to be normal for most part, and as yet we have not discovered evidence of presence of parasitic organism on these organs. (Jennison, July 15).

OAT SMUT REPORTS

The oat smuts are being reported in about the usual amounts from a considerable number of states. The following quotations showing resistance and susceptibility of varieties are of especial interest:

Wisconsin: Wisconsin Pedigree # 5 shows high degree of smut freedom whem compared with other varieties and selections at the Spooner Branch Station. Seventeen varieties in test plots, none treated. (Vaughan, July 11).

Minnesota: First reported June 16 from Anoka and Rice Counties. Varieties Minnesota 108 and Sixty Day showed heaviest infection at Anoka on this date. Infection now fairly general wherever oats are grown. Some fields show as high as 10% infection, while others show only a trace. (Department of Plant Pathology, June 29).

In Louisiana Edgerton reports very light infection of locally raised seed, and in Kansas Melchers reports that seed treatment is becoming quite general.

CROWN RUST OF OATS

Leaf rust of oats (Puccinia coronata) is reported from New York, Delaware, South Carolina, Georgia, and Nebraska. From Louisiana, Arkansas, and Kansas collaborators write as follows:

Louisiana: Oat rust was very severe even on the local resistant varieties. Non-resistant varieties were killed without heading. The

actual loss in the state was not as great as a year ago because there was not as much seed shipped in for planting purposes. (Edgerton, July 15).

Arkansas: Common but less severe than usual. Oats did especially well this year. (Elliott, July 15).

Kansas: Heavy late infection, but too late to cause very much injury. (Melchers, July 15).

ERGOT OF RYE

Small to moderate amounts of ergot (Claviceps purpurea) are being reported. The following statements indicate that the disease is not destructive but is rather widespread in the rye states.

Ohio: Farm of W. C. Garber, Belleville, Richland County. Moderate amount of infection on volunteer rye in clover field. (Young, July 15).

Illinois: Occurring in practically all fields, but the infection is slight with very little loss as a consequence. On volunteer rye our field men are finding an abundance of material. (Tehon, July 15).

Michigan: None seen so far, even on common, volunteer plants. Extremely dry at blossoming time. (Coons, July 1).

Wisconsin: Extensively reported from all sections of the state. Real damage small. (Vaughan, July 15).

Minnesota: About the usual amount of ergot was found on rye this year. Infections seem to be very light in the west central part of the state; particularly heavy infections were found on volunteer rye in various places. In some cases, 15-20% of the kernels in a head were infected. (Section of Plant Pathology, July 15).

South Dakota: Trace, generally a small amount in each field. Of no serious consequence. (Evans, July 15).

ANTHRACNOSE OF RYE

As usual, anthracnose of rye was destructive in Ohio. It will be seen from the following reports that it caused some damage in neighboring states.

Tennessee: Two fields in southern portion of the state heavily infected. (Hesler, June 23).

Ohio: Nearly every planting investigated was infected. It is evident that the disease is state-wide and worse upon rye than any other cereal. In all cases where rye has been grown successively for two or three years there is a complete failure this season. Early reports state that Rosen rye suffered very heavy loss. (Thomas, July 15).

Michigan: I have to report two cases of rye being seriously injured by anthracnose and on the specimens sent to the office abundant production of the fungus such as you supplied us in previous years. In one case it was reported that soil conditions were very unfavorable for normal vigorous growth (Sturgis, Michigan). I merely have the specimens in the second case (Adrian, Lenawee County). The rye was bleached, half filled and died when half grown. (Coons, July 12).

Wisconsin: Reported from a few fields. (Vaughan, July 15).

Minnesota: First reported June 23, in Meeker County. Infection apparently light. Very little damage noted. (Section of Plant Pathology, June 29).

BACTERIAL WILT OF SWEET CORN (BACTERIUM STEWARTII) BAD IN PARTS OF MARYLAND AND VIRGINIA

Under date of July 18, A. G. Johnson reports as follows: "On July 17 Messrs. Woodbury, Metzger, and I inspected about 125 acres of sweet corn at Westminster, Maryland. This disease was found cutting down the yield of Golden Bantam from 50-60%. Of this variety 600 acres were planted, and the total area in sweet corn in this and other varieties was over 1200 acres. The other varieties were much less severely attacked."

F. D. Fromme of Virginia writes on July 18 as follows: "Bacterial wilt has been unusually severe being found in every patch of Golden Bantam seen. One patch showed a 25% infection, another 50% and a third 90%."

MORE ABOUT POWDERY MILDEW OF RED CLOVER

The accompanying maps show the states from which powdery mildew was reported in 1921 and thus far in 1922. The first collaborator's report of powdery mildew on clover in the Plant Disease Survey files is from Sheldon in West Virginia, 1908. Since that year Professor Sheldon has almost annually reported the conidial stage of this mildew as occurring in small amounts in the vicinity of Morgantown, West Virginia. For 1915 reports from Idaho, Washington, and Oregon are available, and since that year Heald and Dana in Washington, and Miss Willis in Idaho, have frequently reported Erysiphe polygoni on red clover. Reports from Utah for 1916 and 1917 are also available.

According to Miss V. K. Charles, the Office of Pathological Collections has specimens showing the perfect stage of the mildew on clover from the following western states. None of the collections from the East, however, show perithecia.

E. polygoni DC. on Trifolium involucratum Willd., near Andrews, Oregon.
E. polygoni DC. on Trifolium variegatum Nutt., Lo Lo, Montana.
E. polygoni DC. on Trifolium pratense L., Delta, Colorado.
E. polygoni DC. on Trifolium pratense L., Caldwell, Idaho.
E. polygoni DC. on Trifolium latifolium, Warrens, Idaho.
E. communis on Vicia Americana, Helena, Montana.

E. communis on Trifolium pratense, North Yakima, Washington.
E. communis on Trifolium involucratum, Wet Mountain Valley.

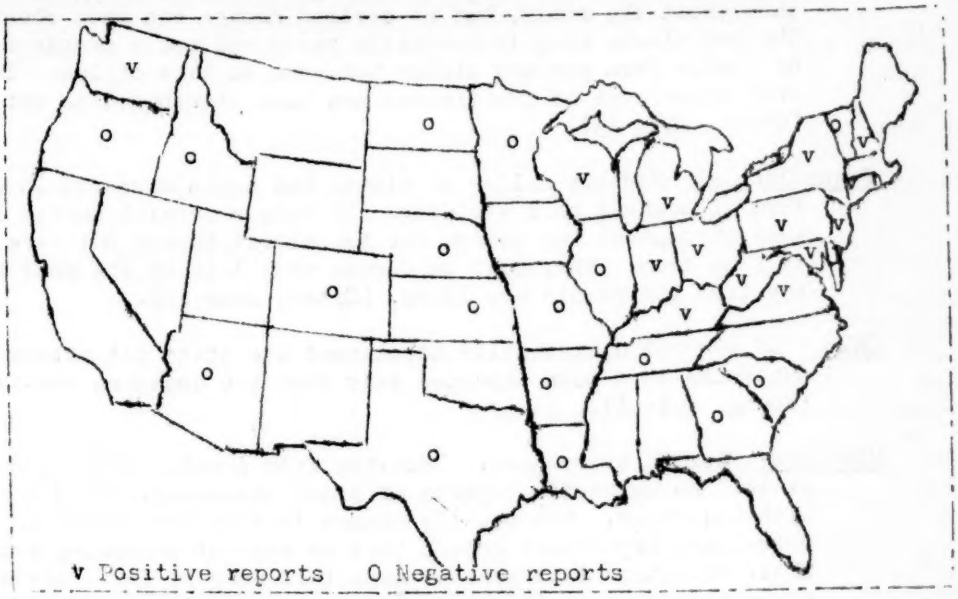

Fig. 7. Geographic distribution of powdery mildew of red clover in 1921, according to Survey reports.

From the State of Washington, B. F. Dana writes July 18, 1922 that the disease is common in its perfect state there. It would appear then that the perithecial stage occurs commonly in the Northwest, but is absent or rare in the East.

In the Survey files reports of the occurrence of powdery mildew on alsike clover are also available from West Virginia in 1908, 1912, and 1915, and from Minnesota in 1919. On white clover, Idaho reports powdery mildew in 1915, 1916, and 1917, with notes that it occurred in moist situations, particularly in fields where over-irrigation was allowed. Sheldon in West Virginia also reported it on white clover in 1912. During the present epidemic in the East neither of these two clovers are reported as affected.

Some of the other reports concerning the occurrence of the disease this year, received since the statement was issued in the July 1 number of the Plant Disease Bulletin are as follows:

Fig. 8 Geographic distribution of red clover powdery mildew, August 1, 1922, according to Survey reports.

Massachusetts: Powdery mildew has been generally noted on red clover throughout the state, but no serious damage has been observed. The red clover crop is unusually heavy and not a single complaint of damage from powdery mildew has come to this office. The general appearance of the disease has been attributed to wet weather. (Osmun, July 15).

Pennsylvania: Powdery mildew of clover has again appeared in epidemic form throughout this vicinity. We made a careful survey last year throughout the season for the cleistothecia but were unable to find them. They must be formed very late in the season at the time the plants are dying. (Orton, June 22).

Ohio: Of general distribution throughout the state but extensive outbreaks have been reported only from the southern counties. (Young, July 1).

Michigan: Common everywhere. Reported from practically all parts of state. No authentic reports of stock poisoning. Mail very heavy with inquiries. Was equally common late in the season in 1921. Veterinary Department report that no case of poisoning came to their attention last year or none this year so far. Advice given this year is to cut early, cure carefully and feed cautiously. (Bessey, July 12).

Minnesota: At the present time the powdery mildew is epidemic in the entire section of the state just south of the east-central part. It seems to extend in epidemic form as far west as Renville County, while fields in the extreme western part of the state are free from the disease. In the infected portions 75-95% of the leaves of the first crop were infected. The second crop almost 100% infection. Plants in new fields are very heavily infected also. (Section of Plant Pathology, July 15).

Iowa: Very common, and destructive to hay crop. Red clover and Mammoth most susceptible. Crimson quite resistant. (Melhus, July 15).

ROOT ROT OF CLOVER REPORTED FROM OHIO

"Clover root rot, caused by Sclerotinia trifoliorum and Fusarium sp., has been less serious than usual as the favorable growing weather has permitted infected fields to outgrow the trouble. At the same time there has been a relative increase in the Sclerotinia as compared with the Fusarium. The former is important mainly in the northwestern and the latter in the southwestern section of the state." (Young, July 1).

OTHER CLOVER DISEASES

Anthracnose, caused by Colletotrichum trifolii. "Serious in a few fields in western Ohio." (Young, July 1).

Leaf spots, caused by Macrosporium sarcinaeforme and Pseudopeziza trifolii, were reported by Young of Ohio on July 1 as follows: "Both of these leaf spots are unusually prevalent in northern and western Ohio and will doubtless lower materially the yield and quality of the hay. In some fields it is difficult to find mature leaves which are free from spots and all the lower leaves are dead."

Leaf spot, caused by Sphaerulina trifolii, was reported from Missouri by Hopkins on July 5 as follows: "This disease appears to be very common in white and alsike clover in Missouri, but it is probably not very serious. The earliest infection observed in Columbia was found March 18, 1922."

Polythrincium trifolii in Illinois. "It is a matter of interest to me to find that in the western part of Illinois, particularly in Madison, St. Clair, Jersey, Menard, Tazewell, and Calhoun Counties, the white clover used largely for pasture purposes is covered to a large extent with the mold Polythrincium trifolii. Practically all pastures where this clover is grown are infested. The infection of plants varies from 30-70% and from 60-70% of the leaves on these plants are affected with reduction of photosynthetic surface of from 2-30%. While there is no apparent financial loss involved by the presence of this mold, it strikes me as being of interest as a correlation with our present widespread attack of powdery mildew on the red clover." (Tehon, June 27).

ALFALFA DISEASES

Leaf spot caused by Pseudopeziza medicaginis is reported from Vermont, Delaware, Missouri, and Kansas. In Missouri Hopkins says, "This disease has been quite severe this season and large numbers of reports and inquiries about it have been received. It is quite generally distributed everywhere alfalfa is grown."

Leaf spot caused by Pleosphaerulina briosiana, was reported from Missouri (About five specimens of this disease have been received, but it does not appear to be doing any damage. Hopkins.) and from Kansas (Quite common, but no marked inquiry. Melchers.).

Leaf spot caused by Ascochyta medicaginis. "This disease has been severe in certain instances and a number of reports and inquiries about it have been received. Besides the spotting of the leaves, specimens have frequently shown badly affected stems." (Hopkins, July 5).

Downy mildew (Peronospora sp.) was reported from Missouri and Kansas.

White top, probably non-parasitic, was reported from Montana. "Very prevalent in first crop in some sections. Cause of much uneasiness. Seems to be combination of environmental conditions prevalent during spring and early summer, which unquestionably aggravated this trouble." (Jennison, July 15).

LATE BLIGHT OF POTATO THREATENING

The month of June was excessively wet in parts of New England and the North Atlantic states, including West Virginia, and also in the northern portion of the Great Lake states. In these same areas considerable rain has also fallen during July. Apparently, then, there has been sufficient moisture to insure initial infections of Phytophthora in our more northern and important late potato areas. Owing to the fact that there was very little blight last year the sources of infection must be comparatively few and this

may tend to retard the development of the disease, however, with continued wet and cool weather during August and September much damage may result, especially late in the season. The disease is already occurring in some of these areas as is shown by the following reports:

Connecticut: Found late blight of potato first on July 7 and on July 20 it was getting a good start. So if wet weather continues it will be serious this year, as July 7 is the earliest, or nearly the earliest, that we have ever found it in this state. (Clinton, July 18).

New York: (Riverhead, Long Island) Late blight is becoming more and more serious; spraying or dusting is general. (E. E. Clayton, July 24).

(Gainesville, Wyoming County) Observed June 30 on volunteer potatoes which are now entirely destroyed. Not observed in cultivated fields to date. (C. R. Stevenson, July 24).

West Virginia: Observed in Tucker County, July 2. The disease was already well established. (Anthony Berg, July 12).

Michigan: Extremely heavy rains have just occurred over the state. The Upper Peninsula and the northern part of the Lower Peninsula have had an abundance of well distributed rainfall in contrast to lower half which has been dry, though somewhat cool. Late blight will probably occur in the northern part this year. Greater interest in spraying than ever before due to activity of county agents with spraying rings. Spray machine manufacturers report greatest year with field machines ever. (Coons, July 12).

Wisconsin: Potato late blight reported from Colby, Wisconsin, by Mr. Carl Hazelburg, field man from Bowker Insecticide Company.

Weather through northern Wisconsin has been cool and wet, ideal for blight. The report from Colby is the earliest I recall. It was a garden plot with very heavy vines. (Vaughan, July 23).

Virginia: (Norfolk Section) No late blight was reported in the trucking section. (T. C. Johnson, July 24).

REPORTS OF BLACKLEG OF POTATO

The following reports indicate that blackleg is a disease of considerable importance in some places this year:

Pennsylvania: More blackleg in Pennsylvania than ever before. Apparently on seed imported from Michigan and Maine. Unusually severe on Cobblers. Prevalence 1-5%. (Thurston, June 27).

Georgia: Reported from one field causing a total loss. Attributed to poor seed from out of state. (McHatton, July 1).

Nebraska: Blackleg reported. Considerable scattered infection in early potato sections given from imported seed. Being held in check by dry weather. (Goss, June 26).

Kansas: Damage of 2-8% in untreated fields, slightly less in treated. Entire plant goes down. (Richard P. White, July 15).

INFORMATION ON POTATO MOSAIC AND LEAF ROLL ESPECIALLY DESIRED

Readers are asked to make as many field observations as possible on these two important diseases this year and to report the same to the Survey for correlating and summarizing. These diseases present one of the most important problems of the potato industry and the seed producing and certification movements, and the bringing together of many miscellaneous observations from different parts of the country may materially assist in hastening the solution of the problem.

From Maryland, C. E. Temple reports that in one field of Jersey Red potatoes 87% leaf roll was observed. From Louisiana, Edgerton writes that excellent success has been obtained with the use of certified seed this season. Some lots showed a high percentage of mosaic but as a rule the certified seed was good. However, about 25% of the potato crop was probably lost in Louisiana this year on account of mosaic, according to Edgerton.

RHIZOCTONIA STEM ROT BAD IN NEBRASKA AND KANSAS

Nebraska: Heavy infection early in season causing considerable killing of sprouts. One field 100 acres, 75% infected when plants were 3 inches high (Goss, June 26).

Kansas: Very prevalent and serious on fields planted with untreated seed stock. Causing a loss this year of from 10-60 bushels an acre. (White, July 15).

HOPPERBURN OR TIPBURN ?

Reports from various parts of the country showing the relative importance of leaf hoppers and physiological factors as causes of burning of potato leaves are greatly needed. More information should be collected concerning the geographic distribution of the two troubles. In some parts of the country, particularly in New England, it would seem that leaf hoppers are not factors of much importance. But in many of the other late potato states they seem to be of primary importance. In 1921 these troubles probably caused greater financial loss to potato growers than any other disease.

Reports are at hand from New Jersey and Kansas indicating considerable hopperburn, while from Minnesota the Section of Plant Pathology reports that "During the hot period, June 1 to 3, there was a great deal of physiological tipburn., The following rain and cool weather effectively checked this trouble."

WATCH FOR YELLOW DWARF OF POTATO

The symptoms of this disease, which is becoming common in New York, are well recorded in the recent article by Barrus and Chupp (Phytopath. 12: 123-132. March 1922). Although these writers state that they have not proved that the disease is communicated with the seed the circumstancial evidence

points very much that way, and since New York produces a large quantity of seed potatoes it is very possible that this disease will be showing up in other states, particularly where New York seed is planted. M. D. Leonard, of the Bowker Insecticide Company, has just reported a case in a four-acre field of Green Mountains at Pompton, New Jersey.

TOMATO MOSAIC ANNUALLY BECOMING OF INCREASED IMPORTANCE

From an examination of past Survey records it would appear that mosaic is rapidly assuming major importance. The following reports concerning the disease have been received to date:

New York: (Long Island) One field observed with 50% of the plants badly diseased. (Clayton, July 24).

New Jersey: On the 24th of June considerable mosaic was found on an acre field of tomatoes at Pompton and from time to time since, plants have been found in two or three other fields of about the same size showing this disease. (Leonard, July 18).

Louisiana: Very severe and widespread. With the control of the wilt by the use of wilt resistant varieties, the mosaic is becoming our most serious tomato trouble. Reductions in yield of over 50% have not been uncommon during the present season. (Edgerton, July 15).

Ohio: Mosaic infection is very serious in certain greenhouse sections. Infection evidently occurred when the plants were very small. We are at a loss to understand how such widespread infection has occurred. (Thomas, July 1).

The recent bulletin on tomato mosaic by Gardner and Kendrick, of the Indiana Experiment Station, (Indiana Agr. Exp. Sta. Bul. 261: 1-24. May 1922) brings to mind again the importance of closely observing wild plants and weeds for symptoms of mosaic and also for other diseases that may be communicated to more valuable crops. The discovery of these wild perennial hosts of tomato mosaic, Physalis sp. and Solanum carolinense, will undoubtedly go a long way in the solution of this increasingly important problem. Collaborators and others will undoubtedly have the opportunity to make valuable observations along these lines during the course of the summer.

FUSARIUM WILT OF TOMATO

THE RESISTANT VARIETIES DEVELOPED BY THE U. S. DEPARTMENT OF AGRICULTURE

The Department of Agriculture has now developed five varieties of tomatoes which, although not immune to wilt, possess enough resistance to insure a good crop if other conditions are favorable. The Marvel, which is a medium early tomato, was selected from Merveille des Marchés and bears a heavy crop of smooth, red fruit. The Norton was selected from Stone and is a late tomato excellent for canning, home gardening, or late trucking. Its yield is heavy and the fruit is smooth, solid, red, ripens slowly, and ships well. The Columbia and Arlington are medium varieties selected from Greater

Baltimore. The Norduke has recently been developed and is similar to Stone and Norton. It shows the highest resistance of any tomato to wilt, and also some resistance to Septoria leaf spot.

As regards the prevalence of Fusarium wilt this year and results with resistant varieties, the following reports are interesting.

South Caolina: Two records. A good many people are growing wilt resistant tomatoes. (Ludwig, July 15).

Georgia: Common in gardens, very serious. (McHatton, July 15).

Mississippi: The disease is present again this season in about the usual amount. Widely prevalent in many parts of the state. The wilt tolerant strains, viz; Norduke, Norton, and Normal developed by Pritchard of the Bureau of Plant Industry are proving to be very satisfactory varieties for the home gardener, and there is already a good demand for seed of these varieties. (Neal, July 15).

Louisiana: Severe as usual in many parts of the state. The Louisiana wilt resistant strains have given excellent results during the present season. (Edgerton, July 15).

Ohio: Wherever commercial seeds of tomatoes are grown in infected soil, the Fusarium wilt disease is occurring this year. It is too early at the present time to estimate losses. First indications point to the fact that they will be very considerable. (Thomas).

BLOSSOM END ROT OF TOMATO

Blossom end rot is common and the cause of considerable loss in South Carolina, Georgia, and Mississippi, according to collaborators. In the latter state, D. C. Neal says that the extremely hot, dry weather that prevailed during the first two weeks of June induced the disease. With the return of more favorable weather conditions the end rot became less conspicuous.

OTHER TOMATO DISEASES

Bacterial wilt (Bacterium solanacearum). Scattered occurrences of this disease are reported, particularly from home gardens, in South Carolina, Georgia, and Louisiana.

Early blight (Alternaria solani).

Mississippi: Not serious this season only in a few localities. One grower reports severe early blight injury in a three-acre field in Holmes County. (Neal, July 15).

Louisiana: In spite of the wet season and apparently favorable conditions, there was less early blight than usual. (Edgerton, July 15).

Root Rot (Heterodera radicicola) was reported as follows from Louisiana: "Very troublesom in some parts of the state, especially the northwest portion. In some sections it is difficult to grow tomatoes on account of the nematodes." (Edgerton, July 15).

BEAN ANTHRACNOSE

Generally speaking, weather which is favorable for late blight of potato is favorable for bean anthracnose. Rainy weather during June and July in the northeastern states would tend to promote infection. The following collaborators' reports have been received:

Vermont: Noted on stems and leaves of garden beans. Not yet in bloom. Wet, cold weather seems to have produced easy infection. (Lutman, June 12).

Massachusetts: Generally present throughout the state, but no serious cases have been noted. (Osmun, July 15).

New Jersey: Anthracnose is common in several small plantings of string beans at Pompton. (M. D. Leonard, July 18).

Delaware: First observed July 7, very common and destructive because of frequent rains. (Adams, July 15).

Georgia: Common and serious on some crops causing large losses in certain fields. (McHatton, July 15).

Arkansas: Some on yellow wax beans, not severe. (Elliott, July 1).

Wisconsin: Observed in Madison. Not reported from other sections. Probably not serious. (Vaughan, July 15).

Minnesota: Only one report of anthracnose has been found this season. This was a half acre plot, found in Ramsey County, July 7. About 3% of the plants were infected, the injury ranging from light to heavy. Individual heavily attacked plants were found from which the disease seemed to be spreading in the field. (Section of Plant Pathology, July 15).

MORE REPORTS OF BEAN BLIGHT

The following additional notes concerning blight caused by *Bacterium phaseoli* have been received:

Massachusetts: Occasional, but not serious. (Osmun, July 15).

Delaware: Leaf infection very prevalent June 19. (Adams, July 15).

Michigan: Looking fine, but bean blight starting actively. (Coons, July 12).

Minnesota: The only reports which have come in so far have been from Ramsey County. In a few fields as high as 95-100% of the plants were infected. So far the disease has been found only on the vines. Many of the gardens in this region which have been inspected are entirely free from the disease. (Section of Plant Pathology, July 15).

CABBAGE YELLOWS DESTRUCTIVE

The following reports, in addition to those given in the July 15 number of this Bulletin, indicate that cabbage yellows, caused by Fusarium conglutinans, is the cause of severe damage this year.

Virginia: Yellows is again causing severe loss in the southwest section. Specimens were also received from Orange County. (Fromme, July 19).

Arkansas: General and severe. (Elliott, July 1).

Michigan: Cabbage club root and yellows found by Nelson to be very serious about trucking section near Grand Rapids. (Coons, July 15).

Kansas: Very severe, especially in fields that have been in cabbage two years or more. Loss runs from slight to about total in some cases. (White, July 15).

Montana: This disease has ruined some small crops. Not commonly seen heretofore. (Jennison, July 15).

NEW YORK REPORTS WILDFIRE OF TOBACCO

ADDITIONAL INFORMATION FROM OTHER STATES

The first report of the presence of this disease in New York State was sent in by H. E. Thomas, July 14. It reads as follows:

"On July 13 I spent part of the day in Chemung County looking at tobacco fields. The county agent and some of the growers are very much concerned about an outbreak of wildfire in some of their fields. I only visited three farms but found wildfire in abundance in two of the three. In the first of these, several counts showed from 93-100% of the plants infected. On the second farm the seed bed was heavily infected and two fields planted with the grower's own plants showed in every count above 95% of the plants infected. A planting in which he used plants from a neighbor's seed bed had not developed wildfire so far as could be seen from the margin of the field, although the plants were growing only a few yards from the seed bed and from the infested field. The tobacco is of the Connecticut-Havana type."

From Virginia F. D. Fromme writes, under date of July 19, that no wild fire was observed in plant bed inspections this year and none has been found in the field to date. This report is in distinct contrast to those that have been received from the more northern tobacco states, where considerable damage has been done.

Other reports on the disease are as follows:

Massachusetts: The situation does not look as serious as it did earlier because of the luxuriant growth of new leaves which have developed in the dry period since the wet spell prior to the middle of the month. The new leaves have largely covered over the infected ones near the ground and I think the tobacco growers are inclined to forget that the disease is present to any extent in their

fields. I hope weather conditions will continue unfavorable to the spread of wildfire for otherwise a lot of growers are going to be greatly disappointed in the condition of their crop by harvest time. (Osmun, July 24).

Connecticut: Wildfire is appearing much more generally distributed in our tobacco fields this year and it looks very much as though in some instances the trouble was brought on by a primary field infection. We have had long continued rains and these have spread the trouble rather rapidly. With dry weather, however, we noticed a check in spread. (G. H. Chapman, July 17).

Georgia: Reported from Tifton. Not serious. (McHatton, July 1).

OTHER TOBACCO DISEASES REPORTED

Blackfire (angular-spot) was reported by Fromme from Virginia under date of July 19 as follows: "Blackfire is beginning to appear in the fields but in only moderate amounts to date. Many fields which have reached the topping stage are free from infection, and in others the injury is restricted to a few bottom leaves. This agrees with plant-bed conditions observed earlier. The plant-beds as a rule were quite free from infection in sharp contrast to the condition that has existed for several years past. No wildfire was observed in our plant-bed inspections and none has been seen in the field to date."

Mosaic is prevalent in the section around Lynchburg, Virginia. All fields seen were infested, the amounts ranging from less than 1% to 50% of the plants. (Fromme, July 19).

Root rot caused by Thielavia basicola.

Connecticut: Owing to the rains and comparatively low soil temperatures, Thielavia injury is being noted to a greater extent than last season, and is particularly noticeable on the earlier set tobacco. The later set crops appear to be doing rather well. (Chapman, July 17).

Kentucky: Root rot is showing up in newly set tobacco in several parts of the state. The resistant standup strains are already showing decidedly better growth than the common varieties. (Valleau, June 23).

ANGULAR LEAF SPOT OF COTTON

Arkansas: More severe than ordinarily, especially the black-arm phase. (Elliott, July 1).

Arizona: Fields planted with untreated seed show occasional plants having black-arm lesions. In one field 133 infected plants were counted on a half-acre. Considerable damage may follow the beginning of the summer rains. Fields planted with seed treated with sulphuric acid show little or no black-arm. (Brown, June 20).

REPORT OF THE DISEASE OF COTTON CAUSED BY ASCOCHYTA

The new cotton disease, recently described from Arkansas by Elliott, (Arkansas Agr. Exp. Sta. Bul. 178: 1-18. April 1922) is reported this year by Elliott as follows: "June 23 - This disease has done some damage in Logan County but has now been checked by dry weather."

CHERRY LEAF SPOT BAD IN MICHIGANS' IMPORTANT CHERRY SECTION

At Traverse City, Michigan, Montmorency cherries were being received at local canning factories at the rate of 40,000 pounds per day during the first part of July. When losses such as are reported below occur, it can well be seen that leaf spot is a factor of importance.

> "Worst in years. Crop loss in Grand Traverse and surrounding counties so far as saleable fruit of size is concerned, total in some orchards. Spraying careless or neglected. College spraying experiments have given perfect control in that region (Farrand). Trade papers estimate loss in yield in cherry district at 10%. Local papers estimate loss at 25%. Higher figure seems probable from appearance of majority of orchards seen from road on recent trip through northern section. In Berrien County loss slight. In Van Buren County loss extremely heavy. Dust has given good control with Morello in Grand Traverse County (Farrand)." (Coons, July 12).

FIRE BLIGHT IN THE EAST

On pears, fire blight has not been reported to the Survey as much more prevalent than usual, but on apples in the belt of states from Virginia west to Kansas it has apparently been especially destructive this season in the form of blossom and twig blight. In Wisconsin, Minnesota, North Dakota, and Iowa, where it has been abundant in recent years, it appears not to be more destructive than usual.

It would seem likely that at the time the apple trees were in blossom this year, conditions were also favorable for oozing of bacteria from hold-over cankers on pear trees and for insect dissemination of the organism. The relation of the infected pear tree to blossom blight of apple has been strikingly shown in the Arkansas survey work mentioned below.

> Massachusetts: The most serious outbreak of fire blight on apples noted in years occurs in several sections of the state. In several instances practically all the new growth of shoots has been killed. In no instance have we noted a serious case of fire blight in orchards which have been thoroughly sprayed, but we are not prepared to attach any significance to this observation. The most serious cases have been observed in Hampshire and Middlesex Counties. (Osmun, July 15).

> Pennsylvania: Pear blight does not seem to have been generally serious this year. In local cases it has been troublesome on pears and quinces, but I have not seen any bad cases on apples resulting from blossom blight. Perhaps this may be due to the killing of

so many blossoms in spring, and to the adverse weather at blooming time, which lessened the transmission by insects. (McCubbin, July 27).

Delaware: First observed May 16 on Transparent and Jonathan and later found on Rhode Island Greening and York Imperial. More prevalent than last three years. More prevalent on pears than apples this season. (Adams, July 15).

Virginia: Fire blight is considerably more severe than in the average year but the injury to the apple crop for the state as a whole will not be great. It is of slight importance in the Valley which produces the bulk of the crop. The Piedmont and Southwest sections were hardest hit, blossom blight being especially common on York and Pippin. As a rule, the larger commercial orchards will escape with slight injury. It is the home or small commercial orchard with a few pear trees nearby that is severely affected. (Fromme, July 19).

Arkansas: In our apple belt in northwest Arkansas I believe we had about the worst blight year I have ever seen. Perhaps it was a little worse in about 1912, though I cannot feel sure of this. The accounts which we received regarding the damages done by this disease have led us to believe that in some instances it caused a loss of 90% of the bloom. Since the blight struck that part of the state we have had numerous complaints from fruit growers in that section, asking the Board to undertake the eradication of pear blight in that section by requiring the destruction of the pear trees. (Geo. C. Becker. July 12).

In general the severity of blight infection within any particular section having the same soil and other conditions varied rather closely with the distance of the pear trees from the apples and it varied to about the same extent with the number of pear trees from which the infection spread. In most all cases where there was a large number of pears the blight was not only worse on the individual trees but was spread farther and more generally throughout the orchard. And though the difference is not so marked, the blight has a noticeable tendency to follow the wind, the prevailing winds coming from the southwest. Within some sections and even on the same farm there were orchards and trees having the same proximity to pears that showed a great difference in the amount of blight present. This was no doubt due in part to the vigor of the tree, as evidenced by tender growth, which was brought about by difference in the fertilizing or care of the orchard. In those cases where infected trees were scattered through the orchard the infection could be attributed to nothing other than the susceptibility of the individual trees.

With only one exception, all of the orchardists with whom I talked consider the close proximity of pear trees to be responsible for the presence of blight in their apple orchards, and all who had pears were willing to have them destroyed. With the exception of those at Bentonville, I did not learn of any pear orchards that were considered of commercial importance. (Geo. W. Winfrey, June 10).

Illinois: Worse than usual but somewhat local. Especially serious as a twig blight and fruit blight. Many apples half grown were rotted. Some sections of the state seemed to have escaped entirely. (Anderson, July 1).

Michigan: Prevalent in certain Duchess orchards in peculiar blossom blight form, causing death of practically all blossom bearing twigs on certain limbs. Strong start as twig blight in May which was checked by dry weather following in June and early July. (Coons, July 1).

Wisconsin: This is quite bad on apples in Wisconsin this year. Those who were here last year tell me, however, that it was worse last year than it is this. (L. R. Jones, July 20).

Minnesota: There is slightly more fire blight this year than last, although it is not nearly so severe as in 1920. In the immediate vicinity of University Farm there are very few infections, although reports indicate that it is fairly heavy in the west central part of the state. The disease seems to be developing late this year and is just appearing in the orchard on the University Farm, at the present time. (Section of Plant Pathology).

Iowa: Apple blotch is much less common than previous years. Occurs only in isolated cases on crabs. (Melhus, July 15).

North Dakota: Although North Dakota is not an apple state, several varieties which are grown here have been attacked by fire blight each year. Fire blight locally is more severe than last year, but hardly more severe than in 1920. Holdover cankers have developed many new infections, twig as well as blossom blight being noticeable about June 1. The spring was cold and rainy, much succulent growth being formed. Several instances have been found where the entire tree was blighted. (Weniger, July 24).

Missouri: There never has been as much fire blight on apples and especially upon the Jonathan and certain varieties of the early apples as there is this year in Missouri as far as the records seem to show. From my own observation I do not believe that fire blight for the state as a whole is more noticeable on the pears this year than for the average year, but on apples it is extremely noticeable and destructive. (H. A. Cardinell, July 14).

REPORTS OF FIRE BLIGHT FROM THE NORTHWESTERN FRUIT SECTIONS

The following information, received from men who are in close touch with the fruit industry of the Northwest, is of much interest:

Montana: Hot dry weather early June to about July 4 appears to have checked the spread of blight in large measure. Trees of the more susceptible varieties quite severely damaged at early date. Crop loss heavy in principal fruit sections due to extraordinary prevalence of twig, spur, and blossom blight. (Jennison, July 1)

Washington: I have been on a trip into several of the apple growing districts of the state and find that pear blight is unusually prevalent in most of them. Here at Wenatchee it is more prevalent than it has been since 1915 but the state inspectors are dealing with the situation very vigorously and I think they have it well in hand. The same is true of the Okanogan Valley. I was particularly interested to note however, that in the Kettle Falls district they are not doing anything about it. We saw oozing and running cankers that they were paying no attention to whatever, also evidences of some blossom blight but the amount of twig blight was not great. (D. F. Fisher, July 21).

Concerning fire blight in this district (Wenatchee) I will say that it has amounted to almost nothing for a number of years past, but is showing up this year in quite a virulent form in two or three very limited portions of this district, such as Stemilt Hill and Stemilt Creek and at Pateros, but I think it is being held in control to prevent serious damage. (P. S. Darlington, July 11).

Oregon: As reported by C. C. Cate, County Pathologist of Jackson County, Medford, under date of July 1, "Fire blight is general. Bad on Spitz (Oesopus) in some localities. Better than last year generally over the county. Seems to be checking up at the present time."

As reported by H. B. Howell, County Agent, Josephine County, July 1, "Fire blight is beginning to run in localized areas, especially on Spitzenburg, and some twig blight on Newtown."

No fire blight has been seen in the Willamette Valley so far this year and in Hood River Valley it is not present in the main orchard districts. Not reported as troublesome in Eastern Oregon. Unknown in the Coast sections. The conditions are evidently not as bad as sometimes and the total damage for the state will not be large in all probability even in the worst sections. (Barss, July 1).

Hood River Valley has never been the center of any serious blight, though occasionally infections have been found for a number of years. These have been cut out properly and as a result the orchards of the Valley can be considered free from this disease. This season, however, blight has been quite prevalent along the eastern edge of the county in scattered orchards which have been more or less neglected in the past. The disease has not appeared to any extent in the plantings of the Valley. This condition has been anticipared as blight has been approaching from eastern Oregon for several years and it is hoped that by vigorous fighting on this border that blight may be kept from the main orchard districts. It is interesting to note that practically all of the infections are found on apples and only rarely has a pear been infected. Last season I had occasion to observe in a blighted district east of the Hood River District, apples very seriously affected along side of Bartlett pears which did not show a single infection. This season we are again finding that it is only rarely that pears show blight infection, though some have been found. As usual the Spitzenberg is the variety suffering most from this disease. I have just recently returned from a trip to Southern Oregon, visiting a number of the fruit districts

to Southern Oregon, visiting a number of the fruit districts throughout that part of the state. Blight is much more prevalent this season than it has been for a number of years, and is quite widely distributed. On the pear varieties of this section, I observed that Bosc and Bartlett show a greater amount of injury than was true of the Anjou and Comice. Blight was noted on apples in southern Oregon adjacent to pear plantings, but in this section the pears appeared to show more blight than was true of apples.

County Fruit Inspector Mills, of the Klickatat County, Washington, which is directly across the Columbia from Hood River County, reports blight quite serious in the east end of the county, but that he had found but few infections in the main plantings of the White Salmon District. He also reports that he has not found a single pear tree infected with the disease, while adjoining Sptizenbergs were damaged so seriously as to require cutting down. He reports Spitzenbergs most noticeably affected, followed by King of Tompkins,and rarely present on adjoining Newtowns and Ortleys. The disease has been found on wild hawthorne, Crataegus sp., and to some extent on service berry, Amelanchier sp., Mr. Mills believes that in one section of this county it would be necessary to remove the native host plants before the diseae can be effectively controlled. (Leroy Childs, July 13).

We have had a rather serious late outbreak of pear blight in this Valley (Bear Creek), similar to the one experienced in the Sacramento Valley in California. I do not, of course, know the cause of the outbreak in California, but possibly they are identical with those in southern Oregon.

First, we had a light blossom infestation, and this was much later than usual. We felt very fortunate until the fruit had reached considerable size, but at that time a serious infestation of the young fruit appeared and this destroyed considerable fruit, and in many cases ran into the branches, necessitating rather heavy cutting. This was not confined to any one variety, but was quite common in practically all of our varieties. It is difficult to account for the late infestation, but it was undoubtedly due to insects. It is quite possible that certain insects, including ants and some of the common thrips, may have been more active than usual. I believe that this is the case. In our own orchards we now have the disease under perfect control, and this is true of most of the commercial orchards in the Valley. In some cases I understand they are still having considerable trouble. (F. G. Reimer, July 17).

Blight is not so bad in the Valley (Rogue River) this year as it has been in the former years. Due to our practice here for the past four or five years of very strict inspection service and to the cooperation of the pear growers, we are holding blight down to minimum amount of infection. Occasionally there are a few orchards that are not thoroughly cleaned up during the dormant period and blight then does considerable damage. Most of our pear growers now practice root and crown inspection as well as trunk and branch inspection, which I think is the biggest factor in controlling blight. (C. C. Cate, July 21).

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